

Gravatt, Dan

From: Tapia, Cecilia
Sent: Friday, June 28, 2013 1:26 PM
To: Gravatt, Dan; Jefferson, Matthew; Singletary, DeAndre
Subject: FW: Health Physicist letter
Attachments: 130625 John Frazier Letter.pdf

Importance: High

Can you save to H drive since Jaci is out all of next week.



Cecilia Tapia
Director, Superfund Division
U.S. Environmental Protection Agency - Region 7
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From: Flournoy, Karen
Sent: Tuesday, June 25, 2013 11:11 AM
To: Huffman, Diane; Bruno, Jodi; Hammerschmidt, Ron; Tapia, Cecilia
Subject: Health Physicist letter
Importance: High

From: John Lodderhose
Sent: Tuesday, June 25, 2013 11:04:45 AM
To: Brian Hoelscher; Susan Myers; Ken Goins; Rich Unverferth; Michael Grace; Jonathon Sprague; Lance LeComb; Rob G Daly
Cc: Nora C. Estopare; Doug Mendoza; Flournoy, Karen; Brooks, Karl; Tippet Mosby, Leanne (Leanne.TippetMosby@dnr.mo.gov); 'chris.nagel@dnr.mo.gov' (chris.nagel@dnr.mo.gov)
Subject: FW: Health Physicist letter

Here is a revised letter from Dr. John Frazier on the Bridgeton Landfill leachate Gross Beta results. There were some typos in his original letter.
Sorry for the confusion.

John R. Lodderhose, P.E.
Metropolitan St. Louis Sewer District
Assistant Director of Engineering
Environmental Compliance
314-436-8714

From: Ed Galbraith [<mailto:EGalbraith@barr.com>]
Sent: Tuesday, June 25, 2013 10:56 AM
To: John Lodderhose; Doug Mendoza; Nora C. Estopare
Cc: Ed Galbraith
Subject: RE: Health Physicist letter

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Superfund

06-01

Here is the revised letter. It was amended on page 2, second paragraph as follows:

...Total Dissolved Solids and Total ~~Dissolved~~ **Suspended** Solids...

Three misspellings were also corrected.

Ed Galbraith

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resourceful. naturally.



From: Ed Galbraith
Sent: Tuesday, June 25, 2013 10:42 AM
To: John Lodderhose
Subject: Health Physicist letter

John, here's the sentence from Dr. Frazier's letter that I think answers the question:

"Eberline's conclusion is that the sample appears to contain beta activity almost entirely from K-40 and that higher activity results are most likely artifacts from analyzing the sample as Total Dissolved Solids and Total Dissolved Solids combined. In other words based on the analysis conducted by Eberline Laboratory, essentially all of the Gross Beta concentration in the leachate sample is from K-40."

Apart from the typo of listing Total Dissolved Solids twice, I think its clear that the Gross Beta analysis is almost entirely from K40. While he does say "essentially all," the Eberline report itself is more definitive. On page 17, (page 2 of the narrative), he states that:

"In conclusion, the sample appears to contain Beta activity from only Potassium 40 within the sample." (emphasis added)

For this reason, I'm going with the 408 number from the Eberline Report. Call me when you get a chance if you still disagree.

I have asked him to fix the typo and will resend the letter shortly.

Ed Galbraith

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June 25, 2013

Mr. Edward Galbraith
Barr Engineering Company
1001 Diamond Ridge, Suite 1100
Jefferson City, MO 65109

Subject: Review of Laboratory Analytical Results for Leachate Sample

Dear Mr. Galbraith:

I have reviewed the results of laboratory analyses of a liquid sample identified as "Treated Commingled MSD". The laboratory reports of analysis for this sample include a report of radiological analyses (Work Order No. 13-06015, dated June 20, 2013) by Eberline Services Laboratory in Oak Ridge, Tennessee, and a report of non-radiological analysis for elemental potassium (K) by Galbraith Laboratories, Inc. in Knoxville, Tennessee (Report No. 52429, dated June 17, 2013). You have advised me that this sample was collected from leachate from a landfill.

As noted in the case narrative for the Eberline report of analysis, the sample was found to have beta-emitting radionuclides (from the Gross Beta analysis) with no positive gross alpha activity (from the Gross Alpha analysis). Additional radiological analyses of the sample demonstrated positive results for potassium-40 (K-40) from gamma-ray spectroscopic analysis of the sample. Potassium-40 is a naturally-occurring, beta-gamma emitter with approximately 89.3% of the decays occurring by beta emission. It is also the most abundant radionuclide in most native soils.

Because gamma-ray spectroscopic analysis for K-40 in the sample (as with most liquid samples) had a relatively high uncertainty of the result and because K-40 is a naturally-occurring radioactive isotope in all potassium (K), Eberline laboratory sent an aliquot of the leachate sample to Galbraith Laboratory for analysis for elemental K. The uncertainty of the analysis used at the Galbraith Laboratory for measuring the concentration of K is reported as +/- 10%, which is much better than the uncertainty (approximately 65-70% at 2 sigma) for the gamma spectroscopic analysis for K-40 at the concentrations measured at Eberline Services Laboratory.

The concentration of elemental K in the sample was measured to be 0.557 milligrams per milliliter (mg/mL). [Note: the food product "NoSalt" distributed by RCN Products, Inc. of Greenwich, Connecticut, contains 0.500 mg of potassium per mg of material. This is approximately equal to the potassium concentration in the leachate sample.] The fractional abundance of K-40 in elemental K is 0.000117 (i.e., 0.0117%). The activity per unit mass of K-40 (referred to as its intrinsic specific activity) is approximately 7,000 picocuries per milligram

(pCi/mg). Based on these conversion factors, the concentration of K-40 in the leachate (derived from the concentration of elemental K) is 0.456 pCi/mL or 456 pCi/L. Because K-40 decays by beta decay 89.3% of its decays, the beta activity concentration of K-40 in the leachate sample is approximately 407 pCi/L.

Eberline's conclusion is that the sample appears to contain beta activity almost entirely from K-40 and that higher activity results are most likely artifacts from analyzing the sample as Total Dissolved Solids and Total Suspended Solids combined. In other words, based on the analysis conducted by Eberline Laboratory, essentially all of the Gross Beta concentration in the leachate sample is from K-40.

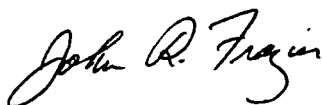
In response to the your request for a health evaluation of the Gross Beta concentration in the leachate sample, I have prepared the following evaluation:

- K-40 is the principal contributor to the Gross Beta concentration in the sample.
- The concentration of K-40 in the sample is approximately 456 pCi/L.
- The radiation dose coefficient for ingestion of K-40 is 0.0000229 millirem per picocurie (mrem/pCi).
- The annual radiation dose for man-made beta emitters in drinking water from a community water supply is 4 mrem. [Note: K-40 is a naturally-occurring radionuclide; not a man-made radionuclide.]
- For comparison purposes, it is informative to note that a person would have to drink approximately 383 liters (100 gallons) of this leachate per year in order to receive a radiation dose of 4 mrem per year.
- Potential radiation doses to individuals (e.g., workers in enclosed facilities where the leachate is present) from other hypothetical exposure pathways are vanishingly small and indistinguishable from radiation doses from natural background radiation sources.

It is unreasonable to assume that anyone would drink any of the leachate; therefore, assuming that anyone would drink 100 gallons of this leachate in a year is a purely hypothetical exercise. Likewise, potential exposure of persons (such as workers at facilities processing the leachate) via other exposure pathways would produce immeasurably small radiation doses, if at all. There is no reasonable scientific basis for concerns from human exposures to beta emitters in this leachate at the radionuclide concentrations found by the analyses at the offsite, commercial analytical laboratories.

Please call me if you have any questions regarding the laboratory data or my assessment of hypothetical human exposures to this leachate.

Sincerely,



John R. Frazier, Ph.D.
Certified Health Physicist